

# Branding News with Political Opinion <sup>\*</sup>

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December 2003

## Abstract

Should the CEO's of newspaper care about the political profile of their newspaper? We investigate whether the political beliefs of the consumers in a market influence the sale. A demand model is estimated using a structural two step estimation technique that allows us to account for the endogeneity arising from the editor's strategic choice on political profile. The demand is generally well behaved. Unit elastic demand cannot be rejected for our monopoly markets. Our results suggest that political newspapers face a higher demand then independent newspapers all other things equal. This implies that if the political composition allows for a political newspaper, potential profits increases.

**Keywords:** demand analysis, product mix choice, product differentiation, monopoly, self-selection

**JEL codes:** C330, D420, L190, L820

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<sup>\*</sup>We would like to thank Jean J. Gabszewicz, Ulrich Kaiser, Kenneth C. Wilbur, Helge Østbye and other participants at the second workshop on Media Economics in October 2003 in Bergen for helpful comments. All errors are the responsibility of the authors. We also acknowledge the financial support of the Norwegian Research Council.

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# 1 Introduction

*"The binding between the newspaper press and the political parties lasted longer in Norway than most other countries."*

Ottosen, Røssland and Østbye (2002)

At the beginning of the twentieth century, newspapers had well defined target groups. In newspapers, businessmen and workers alike found news and opinions written for their group. Since then, society has changed, income and class dispersion have been reduced and consumers of our time will probably feel less compelled to buy their "class" newspaper, if such a thing exists today. But they still vote. Through local elections and national polls, the editors and the newspaper owners are informed about the political preferences of their potential buyers. Is this information still exploited, or is the political line of a newspaper a relic from the past?

The paper has several purposes. First we address the empirical question of newspapers' political product branding, by estimating a demand model of differentiated products for the Norwegian local newspaper markets. Second, we suggest the use of selection models as a remedy against the endogeneity problems that may arise in the differentiated demand studies. The selection models have up till now predominantly been used to account for the effects of individual heterogeneity and ability differences in labor models. Here we extend their usage by translating them into a framework of firms strategic choice of product mix due to market heterogeneity. Hence, we use the approach both as a statistical remedy against possible selection bias in our data, and as a structural solution to the decision problem faced by newspaper editors.

We estimate a demand model of differentiated products: Even if newspapers were to carry the same news, they are not identical and we think that the difference may be observed and measured.

A popular class of differentiated products models are motivated by discrete choice theory (see Berry, Levinsohn and Pakes (1995)(BLP), Nevo (2000) and (Petrin 2002)). While the discrete choice assumption may be problematic in some contexts, the assumptions are quite reasonable for models of newspaper demand. If one excludes the national newspapers, most consumers keep only one local newspaper. The decision is therefore to subscribe or not to subscribe.<sup>1</sup>

When estimating these models, it is common to assume that the characteristics of the products are exogenously given.<sup>2</sup> This may be a fair assumption

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<sup>1</sup>A lot of consumer products are consumed in a more continuous fashion. For instance, everyday commodities like milk and butter is not a "zero-one" decision, but rather a continuous quantity decision. This is as opposed to say, buying a car, where the question rather is whether to buy or not.

<sup>2</sup>There are exceptions. For instance in (Mazzeo 2002) it is proposed a model which endogenizes firm's product type decisions in an empirical differentiated oligopoly study of motel markets along the U.S. interstate highways.

for some products, and especially if the sales in the investigated markets are a small fraction of the total sales of the product, as this makes it less likely that the product is tailored to the demand of these markets. To the extent that characteristics are endogenous, good instruments are hard to come upon.<sup>3</sup>

In the non-strategic world of (non-contestable) newspaper monopolies, the assumption of exogenous characteristics is even less credible. We observe that some newspapers are independent, while others are linked to a party or carries a particular set of political views. If this is a result of profit maximization, we cannot assume that the markets are identical. To the contrary, we must assume that the markets where we observe political newspapers are systematically different from markets of the independent newspapers.

Facing a clearly endogenous characteristic, we suggest a method where we can account for this using other exogenous observable variables. It seems likely that the editor will look to demographic variables and in particular the political distribution of the potential consumers in his market. We therefore model the choice of differentiation of the editors as a function of local demographic variables and the local electoral results.

Our particular market characteristics allow us to solve the endogeneity problem by using selection models more known from labor economics. We are using a two-step method suggested by Heckman (1978), estimating a standard logit model of newspaper demand. To do this, we simplify the question to be whether the newspaper takes a political line or is independent of any particular political group or profile. The characteristic "political line" is then a binary variable that we assume can be explained by variables as the participation rate at the municipal elections and political dispersion measures, and is estimated as a probit maximum likelihood routine in the first step of our model. This allows us to solve the potential problem of endogeneity in the product mix choice by including a Mills ratio in the second step logit demand model.<sup>4</sup>

Our paper relates to several strands of literature, in particular the empirical literature on differentiated products and monopolistic competition and product mix, and the more general theory around strategic behavior in media markets.<sup>5</sup> In the first group, George and Waldfogel (2003) recently look at newspapers and potential consumer externalities due to different local composition of race.<sup>6</sup>

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<sup>3</sup>For instance one uses other competitors product characteristics (excluding prices) and sums of these (Nevo, 2000).

<sup>4</sup>Other empirical papers on newspaper markets estimating differentiated product models include for instance Argentesi (2003), Kaiser (2003). Genesove (2003) chooses a different approach, estimating entry level thresholds for newspapers in the US, finding an increasing newspaper concentration over time.

<sup>5</sup>Gabszewicz, Laussel and Sonnac (2001) and Gabszewicz, Laussel and Sonnac (2002b) model duopoly newspaper markets and strategic effects of advertising. They show for instance that advertising revenue induces the editors of newspapers to moderate the political message they display to their readers to maximize profits. Related to this, Nilssen and Sjørgard (1998) and Anderson and Renault (2003) look at television market program content, advertising and their strategic interaction.

<sup>6</sup>A related problem is the effect from newspapers and media on political voting. See for instance Besley and Burgess (2001) who looks at how the newspaper content in India influence government policy in order to increase votes in elections. Besley and Prat (2001)

Their idea is that similar consumers have similar preferences, thus if a certain type of consumer is more predominant than other types, the newspaper will be influenced by the mix of consumers so that the dominant type consumers are more likely to buy it. They show that this seems to be true, and also provide evidence for product position according to composition of race. As compared to our model they use a somewhat more reduced form approach, comparing econometric correlations across local newspaper markets in the US. Using our two stage model we structurally account also for the endogeneity in the strategic product choice. Our results are complimentary to George and Waldfogel (2003), indicating that the firms may indeed expand markets by choosing the right product differentiation in terms of political profile. Our results suggest that political newspapers face a higher demand than independent newspapers all other things equal. This implies that if the political composition allows for a political newspaper, potential profits increase.

Section 2 gives a short discussion on the newspaper industry, the newspaper markets and politics. Section 3 gives a discussion of demand and supply assumptions that underlie and motivate the study. Section 4 presents the data. Section 5 presents the econometric model. The results are presented in section 6 and section 7 concludes the paper.

## 2 Newspapers, markets and politics

There is little theoretical research on the specific nature of newspaper markets. A notable exception is the research of Gabszewicz, Laussel and Sonnac. They note that newspapers are different from other consumer commodities in that they are sold twice, first to the advertisers and then to the consumers. The double-sided character of the newspaper market introduces some strategic considerations not present in other markets and it has been argued that this makes concentrated markets more likely. As discussed in Gabszewicz et al. (2002b), the presence of advertising revenue may lead the editor to profile the newspaper closer to the rival, expecting the increase in advertising revenue to more than compensate the loss of sales revenue. Of course, advertisers can choose one or the other newspaper, and may prefer the one with the larger sales. This may be a self-enforcing mechanism which leads to the monopolization of the market, as argued in Gabszewicz, Laussel and Sonnac (2002a), and is found in Genesoves (2003) study of the US newspaper market. In contrast to this strand of research, we look at monopolies only. In this case, the presence of advertisers may lower the price, but will not change the optimal characteristics other than through changing the price.<sup>7</sup>

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who analyze the effects of collusion between government and media. Other empirical papers related to product mix and competition include Salvanes, Steen and Sørsgard (2003) and Borenstein and Netz (1999) that analyze airlines choice of flight localization.

<sup>7</sup>Consider a monopoly selling  $x$  copies of a newspaper with  $w$  characteristics at a whole-sale price  $p$  and selling advertisement  $a$  at a price  $q$ ; the maximizing problem is then  $\max_{p,q,w} \{x(p,w)p + a(x(p,w),q)q - C(x(p,w))\}$  and the first order condition for  $p$  is  $x(p,w) + x_1(p,w)(p + a_1(x(p,w),q)q - C_1(x(p,w)))$ , where we assume that more readers gives

## 2.1 The Norwegian newspaper industry

There are quite a large variety of newspapers in Norway today. The traditional daily printed newspapers are still in majority, but newspapers on the Internet have seen some success. In some of the larger cities, there are newspapers that are distributed for free. However, most of these differ from the printed press by having a frequency of 1 copy per week. Three newspapers are using the minority language “lapp” as their main language and seven newspaper use English or some other foreign language. The present study is, however, limited to newspapers distributed more than once a week and printed in Norwegian.

It is common to divide the printed weekly newspapers into three categories: National, regional and local. With two exceptions, Norwegian newspapers rely on subscription to sell their news. The two exceptions are both national newspapers.

The number of newspapers has varied over time. The numbers seem to suggest a flux of entries and exits rather than a steady trend towards a greater or smaller number of newspapers. Only daily newspapers have decreased in numbers after 1952.

Over the last 10-20 years we have seen a change in the ownership structure of Norwegian newspapers. The largest three firms represent 55 % of the total distribution of newspapers in 2002. The labor press “A-pressen” owns 45 newspapers, amounting to 16 % of the market. “Orkla Dagspresse” owns 27 newspapers representing 12 % of total sales. The last big owner is the media conglomerate “Schibsted”, who owns three large national newspapers which represent as much as 27 % of total newspaper consumption in Norway.<sup>8</sup> Hence, even though the market is pretty concentrated on the national level, it is less concentrated if we omit the three biggest national newspapers. We have however not information in our dataset on the ownership structure of the individual local newspapers, and can therefore not control for common ownership. However, as long as we are looking at monopoly newspapers, ownership will not matter to competition. One might argue that advertising rates could differ due to ownership. Romeo, Pittman and Familant (2003) undertake an econometric study of ownership and advertising rates in newspaper monopolies in the US. They conclude that advertising rates in newspapers with joint operation agreements (common ownership) does not significantly differ from newspapers without common ownership.

## 2.2 The Norwegian political system

In Norway, the executive branch of government is divided into three levels. The local level is divided into municipalities and the regional level into provinces. All levels have their own elected representatives. The representatives at the municipal level are on election every four years. They are in charge of sectors that are important to the local inhabitants, such as local schools, local health care,

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higher demand for advertising ( $a_1(x(p, w), q) > 0$ ).

<sup>8</sup>See <http://medienorge.uib.no/main.cfm?ID=188&Medium=Avis>

local communications, local infrastructure and cultural activity. The political representatives on the municipal level have experienced increased responsibility and have now quite much freedom in terms of how to distribute the municipal budget.

The political system is based on proportional representation for all parties that have support above a certain threshold. This results in many parties at the national level and even more at the local level.

## 2.3 The geographical markets

Stigler provided an early definition of a market: “The area within which the price of a commodity tends to uniformity, allowance being made for transportation costs.”<sup>9</sup> The Department of Justice and other antitrust authorities usually use the concept of a small permanent non-transitory increase in price to determine which products are close substitutes to the good in question.

There are some methods used to define markets that exploit the law of one price, either through demand estimation, cointegration methods (see (Asche et al. 1997) or event studies. However, these techniques (as will all techniques based on arbitrage) rely on time series techniques and are thus not available in the present study. Instead we will use actual sales to determine the market boundaries.

Consider two adjacent municipalities (A and B), each of which has its own newspaper. There are very few copies sold of the A newspaper in B, and vice versa. This may be a market sharing agreement, and indeed, in that case a cointegration study would show that their prices vary together. However, the relevant question is why they do not expand into each others markets. From this casual observation, we conclude that if newspaper B is not sold in market A, this is not a question of price or distribution, but of consumer preference.

Newspapers sell local news, and depending on the technology of news gathering, this may include one or more communities. In general consumers seem to be more interested in news from their own community than from the neighboring community. Indeed, there seem to be a hierarchy of news. We care about local, regional, national and international news, yet few of us care about local news which does not occur in our neighborhood.

We exploit this in defining the geographical markets for newspapers. We simply assume that if a newspaper sells a large share of its (the newspaper’s) total volume in one municipality (7 % or more), then the municipality belongs to the newspapers’ market. We started out with 1 % as the breakpoint market share, then we increased the number stepwise and looked at the market definitions that came out for each step. At 7 % the markets had a reasonable geographical structure and coincided with previous market definitions reported by the trade organization. The first step is therefore to define one market for each newspaper. The second step is to control for overlap of markets. If two newspapers sell in the same municipality, we conclude that these two newspa-

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<sup>9</sup>As cited in (Asche, Salvanes and Steen 1997).

pers have a common market, extending to the municipalities that either of the newspapers sell in.

One possible problem with our approach is that we include some markets where the dominating newspaper has a quite low share of their total sales in that market. In particular if this is a monopoly market this could be problematic. However, when we look at the distribution of market shares in our monopoly markets, the average share of total sales in their defined market is 77 %. Furthermore, if a newspaper has only slightly above 7 % in a municipal, and which therefore is included in the newspaper's market definition, *all other* newspapers will have lower market shares. These other newspapers will also typical consist of regional and national newspapers.

An alternative approach would have been to undertake a "manual" market definition based on "judgment". The advantages of our approach is that the rule we use is transparent. Also other studies have used a similar approach to the one used here, see for instance Dewenter (2003) who used a 10 % rule when delineating the local markets for German regional newspapers.

### 3 Demand and supply

#### 3.1 The logit derived model for demand

This paper uses the discrete choice models presented in Anderson, de Palma and Thisse (1992).<sup>10</sup> Using the notation of BLP, we assume that a consumer  $i$  gets utility  $U$  from consuming product  $j$  which is a function of that consumers individual characteristics  $\zeta_i$  and the characteristics of the product  $(x_j, p_j, \xi_j)$ . Consumers with difference  $\zeta$  make different choices. Furthermore we make the restrictive, but standard assumption that the utility is linear in characteristics and prices.

$$U(\zeta_i, p_j, x_j, \xi_j; \theta) = x_j \beta + \alpha p_j + \xi_j + \varepsilon_i \quad (1)$$

The vector  $\theta$  contains parameters to be estimated. Consumer  $i$  will then choose product  $j$ , if

$$U(\zeta_i, p_j, x_j, \xi_j; \theta) > U(\zeta_i, p_r, x_r, \xi_r; \theta) \quad \forall \quad r \neq j \quad (2)$$

Define  $A_j$  as the set of consumers types ( $\zeta$ ) that prefer product  $j$  to all other products, including not buying a good. That is:

$$A_j = \{\zeta : U(\zeta_i, p_j, x_j, \xi_j; \theta) \geq U(\zeta_i, p_r, x_r, \xi_r; \theta), \quad \forall \quad r = 0, 1, \dots, J\} \quad (3)$$

If  $f(\zeta)$  indicates the density of the type in the population, the market share of product  $j$  will then be

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<sup>10</sup>The first studies modeling differentiated products, and that made it tractable for demand estimation was Lancaster (1966) and Gorman (1980). Later McFadden (1981) showed how to implement the approach in discrete choice models.

$$s_j(p, x, \xi; \theta) = \int_{\zeta \in A_j} f(\zeta) d\zeta \quad (4)$$

In this formulation, the market share is equivalent with the probability that a randomly drawn consumer prefers the good  $j$ .

In the traditional formulation of this problem, the firm will set the price such that it maximizes profit. Let there be  $N$  potential consumers in the market, and the demand ( $D(\cdot)$ ) is

$$D(p, x, \xi; \theta) \equiv N s(p, x, \xi; \theta) \quad (5)$$

The exposition has so far been general and has not used the linearity assumption. The linearity assumption together with the assumption that the random variable  $\varepsilon$  is i.i.d. and extreme valued, together ensure that we can use the logit demand function. The assumptions guarantees that the solution to equation 4 is of a closed form and that there is therefore no need to evaluate the integral.

A principal problem of many implementations of the simple logit model is that products with the same market share, will have the same mark-up.<sup>11</sup> A solution to this problem is proposed by Berry (1994) and Berry et al. (1995): By interacting consumer characteristics with product characteristics they obtain more realistic substitution patterns. Unfortunately, the closed form solution is no longer applicable, so estimation is done by simulation.

In more recent years, the discrete choice models of market demand have been extended, see e.g., Nevo (2000) and Petrin (2002). Nevo (2000) looks at market power in the ready-to-eat cereal market, and Petrin (2002) looks at how one can capture the introduction of a new products. In a slightly different vein, Mazzeo (2002) looks at how discrete choice models can be used to analyze how firms locate in geographical space.

In our case, we are looking at monopoly markets rather than oligopoly markets. The “unwanted” structure imposed on the substitution patterns by the logit model in oligopoly markets are clearly less serious when the consumers are faced with only one newspaper in each market. Restricting ourself to the simple logit model is therefore less problematic.

### 3.2 The supply of newspapers

Although the supply side is not explicitly modeled in this study, we assume a certain cost structure guides newspaper production. The most important of these assumptions is constant returns to scale and common shocks in observables such as paper weight and issues per week.

If the choice of editorial line impacts the optimal solution of all the other characteristics and on costs, even a marginal effect would be complex to estimate. We shall however assume that this is not the case. There are two arguments for believing this assumption to be fairly innocuous. First, it seems quite

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<sup>11</sup>A problem first pointed out by Debreu (1960) in a different context, and later discussed in e.g., Bajari and Benkard (2003).



unlikely that the politics of a newspaper should impact on how the consumers evaluate the other characteristics of the newspaper. Second, at a theoretical level, by the envelope theorem<sup>12</sup> an optimal set of characteristics will still be optimal if one of the characteristics is marginally perturbed.

The impact of characteristics on costs in general is in principle quite complex, but unless one believes that say conservative journalists are cheaper than other journalists, it seems quite unlikely that editorial line would have any impact on costs.

We simplify the problem further by assuming that the choice of editorial line is a binary one, a choice between independence of political opinion and taking a political stance.

Even under these assumptions, the structure is potentially still quite complex since the choice of characteristic may affect demand and competition. Luckily, there exists enough local newspaper monopolies in Norway to enable us to investigate the relationship between the choice of characteristics and demand without bias from the strategic effects from duopolistic or oligopolistic competition.

## 4 The data

### 4.1 The sources

The complete dataset includes all newspapers organized in the trade organization called “Mediebedriftenes landsforbund” in 2001 and 2002.

In addition to recording variables such as price and quantities, the trade organization also has historically recorded the political line of the newspaper. For some newspapers this amounted to noting the party supported, while others were viewed less specifically as conservative papers or independent papers.

The municipal statistics are collected from Statistics Norway. Most of the demographic data are up to date only to 2001. We have therefore used 2001 data to represent also 2002.<sup>13</sup>

The municipal elections are held every fourth year, 1999 being the last year that electoral statistics are available for.<sup>14</sup> The last observation for the local political composition is therefore from 1999.

### 4.2 Some summary statistics

The data set includes all printed newspapers in Norway that are published with a weekly frequency of more than one copy per week. For each newspaper we have observations the prices to subscribers, prices per advertising space, the newspaper format (tabloid/broad-sheet), the number of pages and the total

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<sup>12</sup>The envelope theorem that may be extended to certain discrete cases, see (Milgrom and Segal 2002)

<sup>13</sup>The municipal statistics include variables as number of adults, households and average income per capita. These variables are very stable between only two years of data.

<sup>14</sup>2003 is a local election year, but statistics Norway has not made the numbers publicly available yet.

weight of the newspaper over the year. We also have the number of subscribers to each newspaper at the municipal level. These observations were used in the definition of the geographical markets above. From Statistics Norway, we have demographic data at the municipal level, including the adult population, the population density and the distribution of votes at the last municipal election (1999).

Following the rule used for defining the market, an observation is dropped if the newspaper has fewer than 7 % of the total number of subscribers in a municipality. The total number of observations left is 342. These observations are distributed among the defined 79 markets. There are 44 (2001), 45(2002) monopolies, and the largest monopoly market consists of 5 municipals. The distribution of sales in market as share of total sales is shown in Figure 1. The market definitions are shown in Figure 2.<sup>15</sup>

[Figures 1 and 2 approximately here]

The local monopoly markets represents 9.6% of the total newspaper distribution these two years. The remaining 90% consists of the national and regional newspapers, and the local duopoly and oligopoly markets. The following table summarizes some of the other variables in the data set.

Table 1: Summary statistics of the variables

Variable	No.of Obs.	Mean	Std. Dev.	Min	Max
Adults	182	9720	10823	1044	75903
Sale probability (s)	182	0.37	0.08	0.10	0.50
Political dummy (d)	136	0.40	0.49	0	1
Mills ratio	136	-0.007	0.707	-1.685	1.314
Morning iss. dummy	182	0.92	0.28	0	1
Column width dummy	182	45.4	2.1	38	49
Weekend dummy	182	0.74	0.44	0	1
Income	182	215120	29620	168561	352800
Number of issues	182	10543	8710	2626	36608
Distribution dummy	182	0.12	0.33	0	1

The sample consists of 44 (2001) and 45 (2002) newspapers monopolies, divided out on 90(2001) and 92(2002) different municipalities. Of these newspapers there are some missing observations. Therefore, the number of newspaper monopolies used in estimation is 34 for 2001 and 35 for 2002. In the estimation we focus on whether the newspaper takes a political line or not. Table 2 below shows the distribution of political and independent newspapers. The political dummy ( $d$ ) used is defined accordingly.

<sup>15</sup>If we look at the competition markets, the two largest local oligopoly markets contains 11 and 20 competitors. These large markets are due to the fact that only national newspapers

Table 2: Newspapers and political line

			Number of newspapers	Frequency	2001
2001	Independent	$d=0$	21	62 %	2002
	Political	$d=1$	13	38 %	
	Total		34		
2002	Independent	$d=0$	22	63 %	
	Political	$d=1$	13	37 %	
	Total		35		

## 5 Econometric implementation

### 5.1 The logit demand model

The standard approach to estimating the demand derived from a logit distributed discrete choice model is straight forward. The left hand side variable of the demand equation is the share of sold newspapers to the potential demand of the product. It is therefore an estimator of the choice probability of each individual. The potential demand of the newspaper is set to be the "adult" population of the municipality, defined as all persons older than 17 years.<sup>16</sup>

The left hand side variables consists of a set of product characteristics ( $\mathbf{x}$ ), of which the political line is one, and the price ( $p$ ). Since the price is endogenous, we estimate the equation using two-stage least squares (2SLS). The price is instrumented by cost parameters ( $\mathbf{z}$ ).

$$s = \mathbf{x}\beta + p\gamma + u_s \quad (6)$$

$$p = \mathbf{z}\varphi + u_p \quad (7)$$

This system may be estimated using 2SLS, but the consistency of the results is dependent upon the characteristics being exogenous. For this to be true, the choice probability ( $s$ ) must be independent of the characteristic. This makes no sense as long as one of these, political line, is particular important to the consumer. Therefore, the choice probability must be correlated with the characteristic.

If all markets are equal in distribution, all newspapers would look alike, or those that choose the wrong profile would make less money than the average newspaper. Since we observe that newspapers are different, and we assume that

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were excluded from the market definition.

<sup>16</sup>We have also used number of households as a market measure. However, the results do not change substantially. Economic predictions are the same as when using the number of adults, but the standard errors are somewhat larger.

no newspaper consciously chooses to make less money than possible, the only possibility left is that markets differ and editors know it. In other words, the markets are different from each other and the editors exploit this fact when they design the newspaper profile. We must therefore assume that the choice probability is correlated with the political line of the paper, and therefore also with the dummy variable  $d$  that indicates this profile.

## 5.2 A model for political line

The editor will choose the characteristic that gives the highest profit. In the case of editorial line, it seems reasonable to assume that the choice of political line has no cost consequences.<sup>17</sup> Changes in profits from the choice of characteristics under these assumptions will be determined by changes in demand.

The revenue ( $R$ ) from sales is determined by the number of potential consumers in the market ( $n$ ), the probability for them to consume ( $s$ ) and the price of the newspaper ( $p$ ). Of these the latter two depend upon the political characteristic.

$$R(d) = n \cdot s(d)p(d) \quad (8)$$

which implies the following decision rule

$$\begin{aligned} d &= 1 && \text{if } s(d \mid d = 1) - s(d \mid d = 0) > 0 \\ d &= 0 && \text{otherwise} \end{aligned}$$

Hence, the rule implies that you will choose a political line if and only if you can obtain more customers, i.e., a higher probability to consume, by doing so.

At first glance the natural next step would be to include the political dummy in the demand estimation to control for product choice. However, this is premature since the choice of political profile is endogenous. The choice of a political profile is a discrete choice, either political or not, and therefore standard instrumental techniques cannot be used here. Thus, to solve this we will use a selection model approach.

We will assume that whether the newspaper will be political is determined by some exogenous observables, and in particular whether these surpass a certain threshold. Assuming that the vector  $\mathbf{w}$  contains these variables, we have the following model:

$$d^* = \mathbf{w}\alpha + \varepsilon \quad (9)$$

$$d = 1 \text{ if } d^* > 0 \text{ and } 0 \text{ otherwise} \quad (10)$$

where  $d^*$  is an unobserved latent variable determining the threshold for when a political line is being optimal,  $\alpha$  is a vector of parameters on the observables in  $\mathbf{w}$  and  $\varepsilon$  is assumed to be normally distributed with variance 1.

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<sup>17</sup>It is clearly reasonable that the choice of political line does not affect the marginal costs directly. We have also assumed constant marginal costs, so that changes in scale does not imply changes in marginal cost.

The equation 9 takes into account that the likelihood of observing a political newspaper is not independent of the demographic and electoral composition of the municipality, here denoted  $\mathbf{w}$ . Renouncing these variables will lead to a selection problem induced by omitted variables.

The system can be jointly estimated using maximum likelihood or by a two-step method originally suggested by Heckman, which is the approach taken here. The key to this approach is to recognize that the  $d = 1$  only if  $d^* = \mathbf{w}\alpha + \varepsilon > 0$ .

If we return to the demand equation, we can write<sup>18</sup>

$$\begin{aligned} E[s \mid d = 1, \mathbf{x}, \mathbf{z}] &= \mathbf{x}\beta + p\gamma + E[u \mid d = 1, \mathbf{x}, \mathbf{z}] \\ &= \mathbf{x}\beta + p\gamma + \rho\sigma_\varepsilon \frac{\phi(\mathbf{w}\alpha)}{\Phi(\mathbf{w}\alpha)} \end{aligned} \quad (11)$$

The latter term constitutes the ratio of the normal p.d.f. ( $\phi(\mathbf{w}\alpha)$ ) and the normal c.d.f. ( $\Phi(\mathbf{w}\alpha)$ ) weighted by a variance ( $\sigma_\varepsilon$ ) and a covariance term ( $\rho$ ). (Maddala 1983) The term is called the inverse Mills ratio, often denoted by  $\lambda$ . This ratio will be  $-\phi(\mathbf{w}\alpha)/(1 - \Phi(\mathbf{w}\alpha))$  for the observations where  $d = 0$ .

As Heckman suggests, equation 11 can be estimated consistently if the inverse Mills ratio is included in the regression. Although not directly observable, we can estimate this ratio using a first step probit estimation of equation 9, but using the political dummy variable  $d$ , as a left hand side variable. This estimation allows us to calculate an estimator of the inverse Mills ratio, and therefore in the second step to include this variable in the regression that we are interested in - the demand equation. The equation to be estimated in the second step is therefore:

$$s = \mathbf{x}\beta + \lambda + p\gamma + u_s \quad (12)$$

The Mills ratio can be interpreted as the likelihood of choosing a political line in those markets where no newspapers with a political profile is observed in the data. A somewhat imprecise interpretation of this procedure is that by including the Mills ratio in the second step equation, we make the binary  $d$  variable continuous, since the sum of  $d$  and  $\lambda$  will be continuous. The second step demand equation can therefore be consistently estimated using standard 2SLS.

Since we include only monopoly markets we might be exposed to a possible selection problem. This will also be accounted for using the Heckman two stage approach.

## 6 Results

First we undertake a "naive" demand estimation of the logit demand model, where we disregard the endogeneity problem stemming from strategic product choice and possible selection problems. In addition to *price*, and  $d$ , the  $\mathbf{x}$  matrix consists of the following characteristics; column width (*columnwth*), a

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<sup>18</sup>Remember that  $d$  is included in  $\mathbf{x}$ .

dummy indicating whether the newspaper comes as a morning issue (*morning*), a dummy that indicates whether the newspaper is published in the weekend (*weekend*) and finally the demographic variable average income per capita in each municipal (*income*).<sup>19</sup> We estimate the demand model using 2SLS with number of copies per year and distribution method as cost instruments.

To exploit as much information as possible we estimate the demand model on the municipal rather than the market level. As long as we are controlling for possible differences in demographics, we gain information, and since the logit model is normalized in market shares division in sub markets is possible.

The results with robust standard errors are presented in Table 3. As is clear from the Table the model taking all characteristics as exogenous does not work very well. Only one of the parameters are significant different from zero and the price elasticity is only -0.05 and indistinguishable from zero. Interestingly enough, it is only the political dummy variable,  $d$  which is significant, the variable that potentially is leading to the inconsistency of the estimation. This suggests that by accounting for the strategic choice of product mix the demand results are likely to change.

Table 3: The "Naive" Logit Demand Model

Variable	Coefficient	
price	-0.03	(0.05)
political dummy (d)	0.14***	(0.05)
morning issue	0.03	(0.08)
column width	0.0003	(0.01)
weekend	-0.08*	(0.04)
income	-0.32	(0.21)
constant	2.95	(2.61)
Demand Elasticity ( $\eta$ )	-0.05	
Test: $\eta = 0$		(0.29)†
Test: $\eta = -1$		(111.34)†
Income Elasticity ( $\eta_y$ )	-0.56	
Test: $\eta_y = 0$		(2.29) †
Number of obs.	136	
Significance levels: * 10 % , ** 5 % , *** 2.5 %		
† denotes chi-square errors		

<sup>19</sup>The price is defined as a weighted average unit price, based on the subscription fee per issue and the non-subscriber store price per newspaper issue.

Now we turn to the two stage Heckman procedure. As pointed out in the introduction, the working hypothesis is that newspaper owners or editors are pragmatic in their choice of political view and carve them out to fit the market. Furthermore, we assume that the political composition of the municipals in the local markets determines the strategic product mix choice.

To operationalize this hypothesis, we define a vector of exogenous observable variables  $\mathbf{w}$  which we believe to be important to the editors choice of political profile.  $\mathbf{w}$  contains the participation rate of voters at the municipal election in 1999 (*particip*), a variable that measures political dispersion (*dispersion*) and finally we control for market size by including the number of adults (*adults*).<sup>20</sup>

In the first step regression of the Heckman model we cannot estimate the model on the municipal level. First of all,  $d$  does not vary across years and municipalities in the same market. Furthermore, now we are addressing the firms' product mix choice, and this will depend on the whole market. To estimate this model on the municipal level would therefore create a biased estimate of the Mills ratio. In the demand model, however, we look at the consumer choice, and this does not depend on market size. Hence, we estimate the probit model of the dummy variable equation 10 with  $d$  as the left hand side variable using the market level information in  $\mathbf{w}$ . The results of the probit estimation is shown in Table 4.

Table 4: The First Step Probit Regression used to calculate the Mills Ratio

Variable	Coefficient	
Particip	-10.42*	(5.42)
adults (1000)	0.04***	(0.01)
Dispersion	-4.80**	(2.25)
Constant	6.34*	(3.41)
<hr/>		
Number of obs.	69	

Significance levels: \* 10 % , \*\* 5 % , \*\*\* 2.5 %

The larger the market the more likely we are to observe a political newspaper. The variable *adults* is positive and significant. The *dispersion* variable is negative, suggesting that the more spread out the local political composition is, the less likely one is to observe a political editorial line. In particular if a large dispersion is due to a more even distribution of the political parties, this result

<sup>20</sup>The dispersion variable is measured as the sum of voters that voted for the most conservative party "Fremskittspartiet", the most socialistic party "Rød Valgallianse" and other local parties as "The green party" "The senior party" etc. In general these voters represents the tails of the political distribution.

seems reasonable.<sup>21</sup>

This finding is interesting also in another context, namely the phenomenon of fewer and fewer two newspaper communities. In Norway we have seen a historical development towards more political dispersion. Our results suggest that in a monopoly markets the choice of political profile matters to profit. If this is true, we can infer from our result that it will be less and less profitable to differentiate politically in duopoly markets if the political dispersion reduces over time.<sup>22</sup> Hence, our results suggest a possible explanation for the reduction in duopoly markets that we have observed in so many countries.

The electoral participation variable comes out negative and significant at a 10% level. This may seem as a paradoxical result: Intuitively, one would think that a high electoral participation reflects a politically engaged population providing fertile ground for political newspapers. However in all models estimated we find the same negative result for the participation variable. Now we can calculate the Mills ratio, and estimate the second step demand function.<sup>23</sup> The results from the regression of the second step model are presented in Table 5.

When we compare the logit model in Table 5 with the "naive" demand model in Table 3 we observe several changes. Five of the parameters are now significant at a 5% level, as compared to one in the "naive" model. The demand elasticity is now significant at a 5% level, and suggest an elasticity of -0.63, obviously more reasonable then -0.05 from the "naive" model. When testing against unit elastic demand we can include -1 in the confidence interval on all interesting significance levels. Something that is comforting all the time we are looking at only monopoly markets.

The income elasticity seems at first glance to be strange, suggesting that local newspapers are an inferior good. However, considering that consumers



Table 5: The Second Step Logit Demand Model with the Mills Ratio included

Variable	Coefficient	
price	-0.35**	(0.18)
political dummy (d)	0.68***	(0.22)
Mills ratio	-0.40***	(0.15)
morning issue	0.42***	(0.19)
column width	0.05	(0.03)
weekend	-0.07	(0.06)
income	-1.30**	(0.63)
constant	12.49*	(6.60)
Demand Elasticity ( $\eta$ )	-0.63	
Test: $\eta = 0$		(3.85)†
Test: $\eta = -1$		(1.37)†
Income Elasticity ( $\eta_y$ )	-2.30	
Test: $\eta_y = 0$		(4.28)†
Number of obs.	136	

Significance levels: \* 10 % , \*\* 5 % , \*\*\* 2.5 %

† denotes chi-square errors

consumers buy several newspapers, whereas less affluent consumers only buy one, if any, and then they will buy the local one.

Both the morning issue and the column width parameter are positive. Newspapers delivered in the morning raises demand. Larger column width that is closely related to being a broad sheet newspaper, suggest also higher market shares (only significant at a 16% level). The weekend dummy is insignificant.

Finally we find that the political dummy is clearly significant and suggest a positive demand effect. Hence, political newspapers face a higher demand then independent newspapers all other things equal. This implies that if the political composition allows for a political newspaper, potential profits increases. One explanation for this result might be that readers of political newspapers are more loyal than readers of independent newspapers.

## 7 Conclusion and further work

We estimate a model of demand on a set of concentrated newspaper markets. We postulate that there might be room for firms to raise profits by choosing the right form of product characteristics. In particular we focus on the effect of the

editorial line in terms of being political or non-political. The choice of political profile is considered as a strategic choice of product mix which is treated as endogenous. We use a two stage estimation method to account for selection bias stemming from this endogeneity. The approach therefore both work as a statistical remedy against possible selection bias in our data, and as a structural solution to the decision problem faced by newspaper editors.

The results indicate that the firms may indeed expand markets by choosing the right product differentiation. Unit elastic demand cannot be rejected, something that is reasonable since the analyzed newspapers are monopolies.

Our results suggest that political newspapers face a higher demand than independent newspapers all other things equal. This implies that if the political composition allows for a political newspaper, potential profits increases. A tempting explanation for this result might be that readers of political newspapers are more loyal than readers of independent newspapers.

Finally, what we find here is complimentary to the results in George and Waldfogel (2003) in the sense that product mix seems to matter - in our case political line - in their case composition of race.

## 7.1 Remaining challenges and further work

An interesting extension of our study would be to extend the time series dimension of our dataset, to be able to look at the dynamics structure of changes in political profile of newspapers and changes in local political composition over time.

Although data set include all relevant variables for most of the newspapers for the last two years, we have purposely limited this study in both scope and data.

It is well known from theory that a duopoly will either center on the same location or diversify to the maximum distance. To study the demand and not strategic interaction, we have excluded all but the monopolies. Limiting the study thus, excludes strategic effects on the choice of characteristics.

There is quite a lot of difference both in scale of production and distribution between the newspapers. Roughly, one may distinguish between local, regional and national newspapers. They have some overlap in news, and to a certain extent must probably be viewed as competitors. We have however chosen to exclude the regional and national newspapers from this study to make the population of newspapers as homogeneous as possible.

We have also chosen to ignore an important source of newspaper revenue: advertising. At present, it is not possible to calculate the revenues from this activity. However, as long as the study is limited to monopolies, ignoring this source of revenue should not influence the results. Advertisers are interested in as many readers as possible and newspapers are interested in maximizing the number of readers. The preferences of advertisers may off course influence pricing policy towards lower prices or more discriminatory pricing, but it should not influence the choice of characteristics as the political line.

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**FIGURE 1**

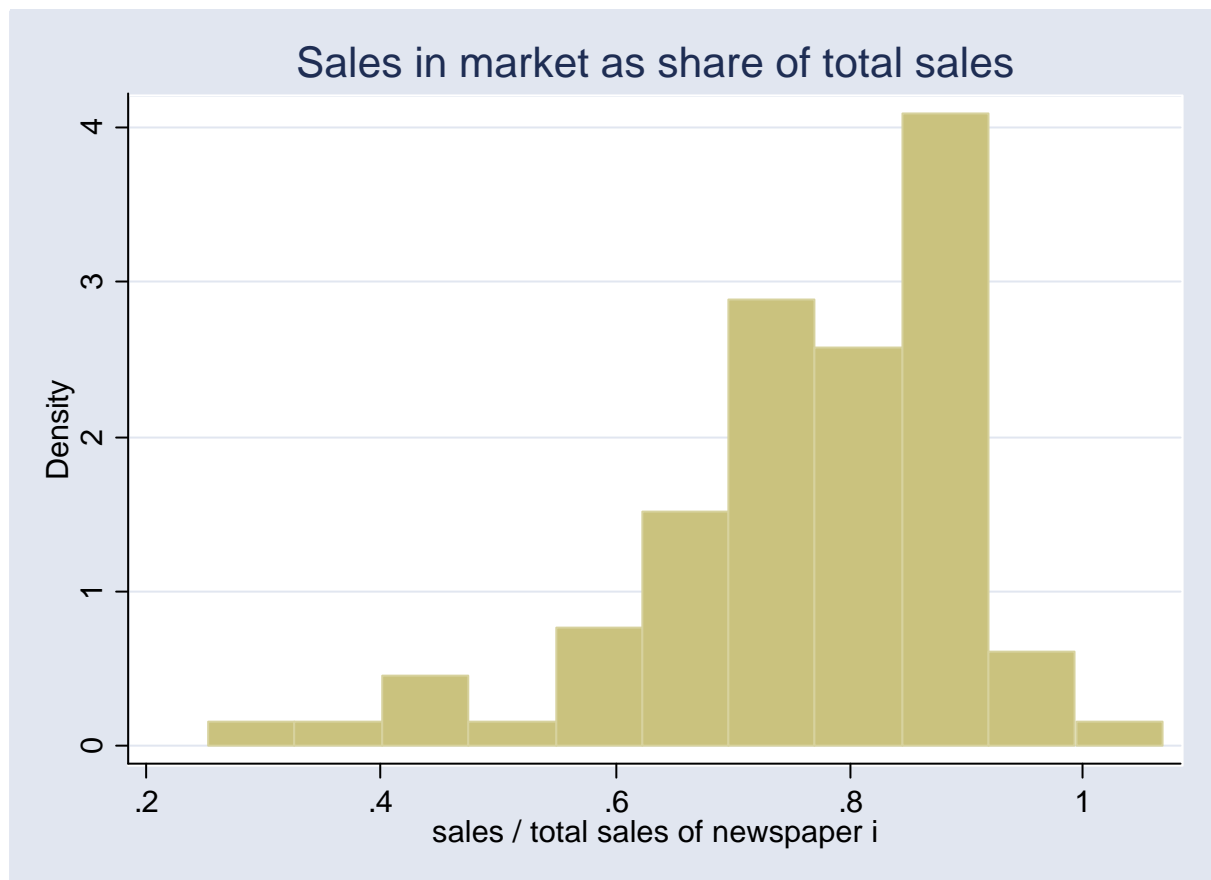


FIGURE 2

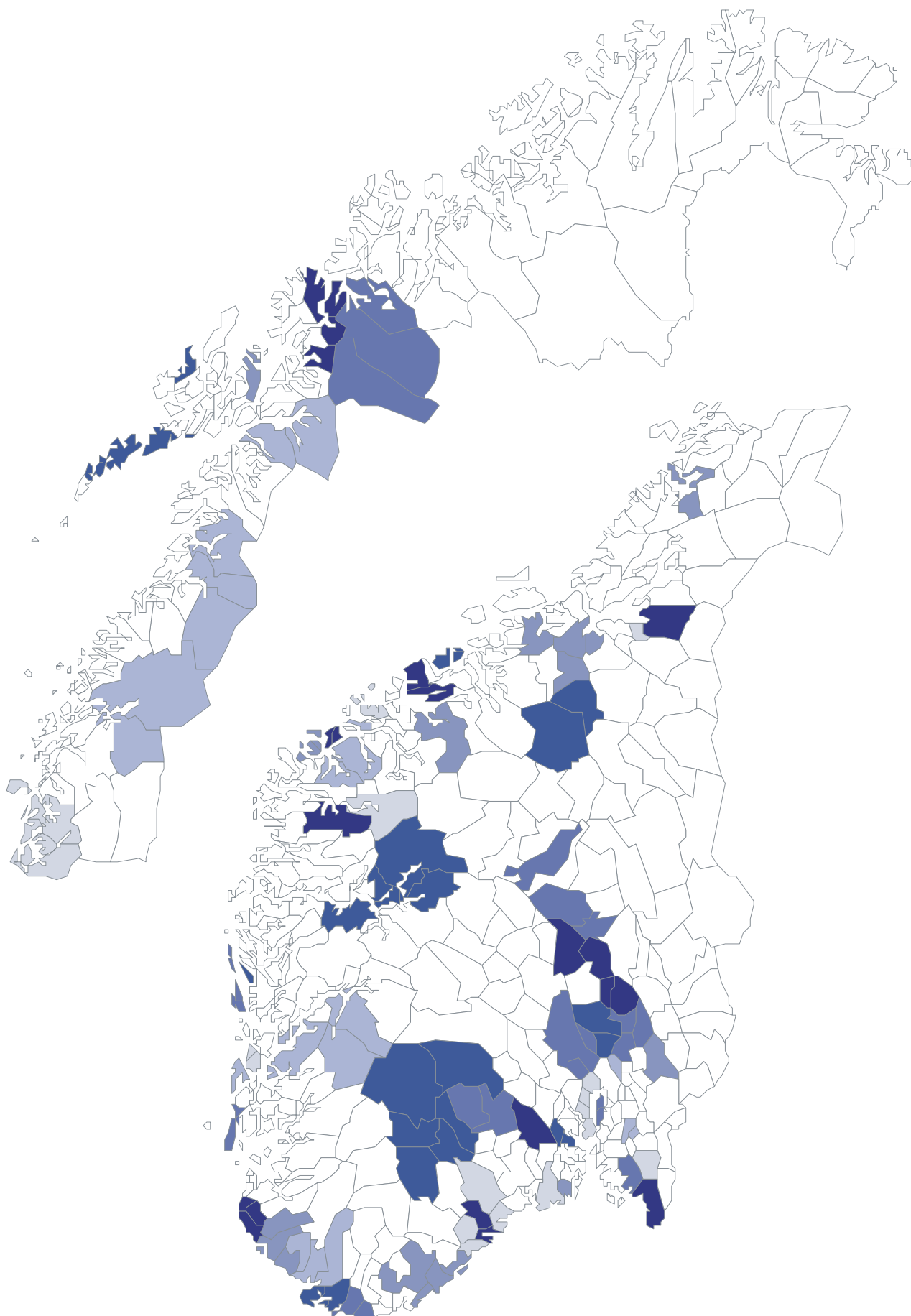


FIGURE 2

